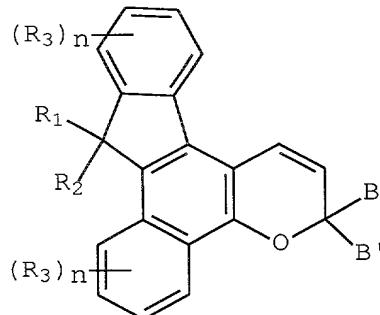


We claim:

1. A naphthopyran compound represented by the following graphic formula:

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15 wherein,

(a) R_1 and R_2 are each selected from the group consisting of:

(i) hydrogen, hydroxy, amino, mono- and di-substituted amino, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_3-C_7 cycloalkyl, allyl, benzyl, mono-substituted benzyl, halogen and the group, $-C(O)W$, wherein W is hydroxy, C_1-C_6 alkyl,

C_1-C_6 alkoxy, phenyl, C_3-C_7 cycloalkyloxy, mono-substituted phenyl, phenoxy, amino, mono(C_3-C_7)alkylamino, di(C_1-C_6)alkylamino, morpholino, piperidino or pyrrolidyl,

25 said amino substituents being selected from the group consisting of C_1-C_6 alkyl, phenyl, benzyl and naphthyl, said benzyl and phenyl substituents being C_1-C_6 alkyl, C_1-C_6 alkoxy, piperidino, morpholino, di(C_1-C_6)alkylamino or fluoro;

30 (ii) unsubstituted, mono- di- and tri-substituted members selected from the group consisting of phenyl, naphthyl, phenanthryl, pyrenyl, quinolyl, isoquinolyl, benzofuranyl, thienyl, benzothienyl, dibenzofuranyl, dibenzothienyl, carbazolyl, and indolyl, said group substituents in (a)(ii) being selected from the group consisting of halogen, C_1-C_6 alkyl, C_1-C_6 alkoxy, morpholino, piperidino, pyrrolidino, amino, mono- and di-substituted

TECHNICAL FIELD

amino, said amino substituents being selected from the group consisting of C₁-C₆ alkyl, phenyl, benzyl and naphthyl;

(iii) monosubstituted phenyl, having a substituent at the para position that is a linking group,

5 - (CH₂)_t- or -O-(CH₂)_t-, wherein t is the integer 1, 2, 3, 4, 5 or 6, connected to an aryl group, which is a member of another photochromic naphthopyran;

(iv) a group, -OR₅, wherein R₅ is C₁-C₆ alkyl, C₁-C₆ acyl, phenyl(C₁-C₃)alkyl, mono(C₁-C₆)alkyl substituted

10 phenyl(C₁-C₃)alkyl, mono(C₁-C₆)alkoxy substituted phenyl(C₁-C₃)alkyl, C₁-C₆ alkoxy(C₂-C₄)alkyl, C₃-C₇ cycloalkyl, mono(C₁-C₄)alkyl substituted C₃-C₇ cycloalkyl, C₁-C₆ haloalkyl, allyl, benzoyl, monosubstituted benzoyl, naphthoyl or monosubstituted naphthoyl, said benzoyl and

15 naphthoyl group substituents being C₁-C₆ alkyl or C₁-C₆ alkoxy; or R₅ is the group -CH(R₆)Q, wherein R₆ is hydrogen or C₁-C₃ alkyl and Q is -CN, -CF₃, or -COOR₇, and R₇ is hydrogen or C₁-C₃ alkyl; or R₅ is the group, -C(O)V, wherein V is

hydrogen, C₁-C₆ alkoxy, phenoxy, mono- or di-(C₁-C₆)alkyl 20 substituted phenoxy, mono- or di-(C₁-C₆)alkoxy substituted phenoxy, an unsubstituted, mono- or di-substituted aryl group, amino, mono(C₁-C₆)alkylamino, di(C₁-C₆)alkylamino, phenylamino, mono- or di-(C₁-C₆)alkyl substituted phenylamino, or mono- or di-(C₁-C₆)alkoxy substituted phenylamino, said 25 aryl group substituents being C₁-C₆ alkyl or C₁-C₆ alkoxy;

(v) a group, -CH(Q')₂, wherein Q' is -CN or -COOR₈, wherein R₈ is hydrogen, C₁-C₆ alkyl, phenyl(C₁-C₃)alkyl, mono(C₁-C₆)alkyl substituted phenyl(C₁-C₃)alkyl, mono(C₁-C₆)alkoxy substituted phenyl(C₁-C₃)alkyl, or an

30 unsubstituted, mono- or di-substituted aryl group, each of said aryl group substituents being C₁-C₆ alkyl or C₁-C₆ alkoxy;

(vi) a group, -CH(R₉)G, wherein R₉ is hydrogen, C₁-C₆ alkyl or an unsubstituted, mono- or di-

35 substituted aryl group, and G is hydroxy, C₁-C₆ alkoxy, aryloxy, amino, mono(C₁-C₆)alkylamino, di(C₁-C₆)alkylamino,

phenylamino, mono- or di-(C₁-C₆)alkyl substituted phenylamino, or mono- or di-(C₁-C₆)alkoxy substituted phenylamino, -COOR₈, -COR₁₀ or -CH₂OR₁₁, wherein R₁₀ is hydrogen, C₁-C₆ alkyl, an unsubstituted, mono- or di-substituted aryl group, amino,

5 mono(C₁-C₆)alkylamino, di(C₁-C₆)alkylamino, phenylamino, mono- or di-(C₁-C₆)alkyl substituted phenylamino, mono- or di-(C₁-C₆)alkoxy substituted phenylamino, diphenylamino, mono- or di(C₁-C₆)alkyl substituted diphenylamino, mono- or di(C₁-C₆)alkoxy substituted diphenylamino, morpholino, or

10 piperidino, wherein R₁₁ is hydrogen, -C(O)R₈, C₁-C₆ alkyl, C₁-C₃ alkoxy(C₁-C₆)alkyl, phenyl(C₁-C₃)alkyl, mono(C₁-C₆) alkoxy substituted phenyl(C₁-C₃)alkyl, or an unsubstituted, mono- or di-substituted aryl group, each of said aryl group substituents being C₁-C₆ alkyl or C₁-C₆ alkoxy; and

15 (vii) a group, T, represented by the formula:
-Z[(OC₂H₄)_x (OC₃H₆)_y (OC₄H₈)_z]Z' or
-[OC₂H₄)_x (OC₃H₆)_y (OC₄H₈)_z]Z'

wherein -Z is -C(O)- or -CH₂-, Z' is C₁-C₃ alkoxy or a polymerizable group, x, y and z are each a number between 0 and 50, and the sum of x, y and z is between 2 and 50; or

20 (viii) R₁ and R₂ together form an oxo group, a substituted or unsubstituted spiro-carbocyclic ring containing 3 to 6 carbon atoms or a substituted or unsubstituted spiro-heterocyclic group containing 1 or 2 oxygen atoms and 3 to 6 carbon atoms including the spirocarbon atom, said spiro-carbocyclic ring and spiro-heterocyclic group being annellated with 0, 1 or 2 benzene rings, said substituents being hydrogen or C₁-C₆ alkyl;

25 (b) each R₃ is independently selected from the group consisting of hydrogen, C₁-C₆ alkyl, C₁-C₆ alkoxy, C₃-C₇ cycloalkyl, phenyl, benzyl, di(C₁-C₆)alkylamino, dicyclohexylamino, diphenylamino, piperidyl, morpholinyl, pyridyl, halogen, a group, T, and the group -C(O)W and n is the integer 0, 1, or 2; or when n is 2, and the R₃ substituents are adjacent, each pair of substituents

independently forms a substituted or unsubstituted fused carbocyclic or heterocyclic ring selected from the group consisting of benzo, pyridino, pyrazino, pyrimidino, furano, dihydrofuran, 1,3-dioxolo, 1,4-dioxolo, 1,3-dioxino, 1,4-dioxino, thiopheno, benzofuro, benzothieno, indolo, and indeno, the substituents of said fused carbocyclic or heterocyclic ring being selected from the group consisting of halogen, C₁-C₆ alkyl, C₁-C₆ alkoxy, amino, mono- and di-substituted amino, said amino substituents being selected from the group consisting of C₁-C₆ alkyl, phenyl, benzyl and naphthyl; said first R₃ ring being fused to the o, p or q side and said second R₃ ring being fused to the g, h, or i side of the naphthopyran;

(c) B and B' are each selected from the group consisting of:

(i) mono-T-substituted phenyl
(ii) an unsubstituted, mono-, di-, and tri-substituted aryl group;
(iii) 9-julolidinyl and an unsubstituted, mono- or di-substituted heteroaromatic group selected from the group consisting of pyridyl, furanyl, benzofuran-2-yl, benzofuran-3-yl, thienyl, benzothien-2-yl, benzothien-3-yl, dibenzofuranyl, dibenzothienyl, carbazoyl, benzopyridyl, indolinyl and fluorenyl, each of said aryl and heteroaromatic substituents in (c) (ii) and (iii) being selected from the group consisting of hydroxy, aryl, mono(C₁-C₆)alkoxyaryl, di(C₁-C₆)alkoxyaryl, mono(C₁-C₆)alkylaryl, di(C₁-C₆)alkylaryl, haloaryl, C₃-C₇ cycloalkylaryl, C₃-C₇ cycloalkyl, C₃-C₇ cycloalkyloxy, C₃-C₇ cycloalkyloxy(C₁-C₆)alkyl, C₃-C₇ cycloalkyloxy(C₁-C₆)alkoxy, aryl(C₁-C₆)alkyl, aryl(C₁-C₆)alkoxy, aryloxy, aryloxy(C₁-C₆)alkyl, aryloxy(C₁-C₆)alkoxy, mono- and di-(C₁-C₆)alkylaryl(C₁-C₆)alkyl, mono- and di-(C₁-C₆)alkylaryl(C₁-C₆)alkoxy, mono- and di-(C₁-C₆)alkoxyaryl(C₁-C₆)alkoxy, amino, mono(C₁-C₆)alkylamino, di(C₁-C₆)alkylamino, diarylamino, piperazino, N-(C₁-C₆)alkylpiperazino, N-arylpiperazino, aziridino,

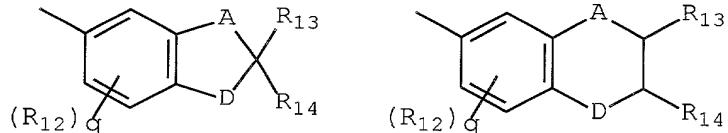
indolino, piperidino, morpholino, thiomorpholino, tetrahydroquinolino, tetrahydroisoquinolino, pyrryl, pyrrolidyl, C₁-C₆ alkyl, C₁-C₆ haloalkyl, C₁-C₆ alkoxy, mono(C₁-C₆) alkoxy(C₁-C₄) alkyl, acryloxy, methacryloxy and 5 halogen;

(iv) an unsubstituted or mono-substituted member selected from the group consisting of pyrazolyl, imidazolyl, pyrazolinyl, imidazolinyl, pyrrolinyl, phenothiazinyl, phenoxazinyl, phenazinyl and acridinyl, each 10 of said substituents being selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, phenyl, and halogen;

(v) monosubstituted phenyl, having a substituent at the para position that is a linking group, -(CH₂)_t- or -O-(CH₂)_t-, wherein t is the integer 1, 2, 3, 4, 5 15 or 6, connected to an aryl group, which is a member of another photochromic naphthopyran;

(vi) a group represented by one of the following graphic formula:

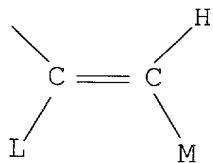
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wherein A is methylene or oxygen and D is oxygen or 25 substituted nitrogen, provided that when D is substituted nitrogen, A is methylene, said nitrogen substituents being selected from the group consisting of hydrogen, C₁-C₆ alkyl, and C₂-C₆ acyl; each R₁₂ is C₁-C₆ alkyl, C₁-C₆ alkoxy, hydroxy, or halogen; R₁₃ and R₁₄ are each hydrogen or C₁-C₆ 30 alkyl; and q is the integer 0, 1, or 2;

(vii) C₁-C₆ alkyl, C₁-C₆ haloalkyl, C₁-C₆ alkoxy(C₁-C₄) alkyl, C₃-C₆ cycloalkyl, mono(C₁-C₆) alkoxy(C₃-C₆) cycloalkyl, mono(C₁-C₆) alkyl(C₃-C₆)-cycloalkyl, halo(C₃-C₆) cycloalkyl, and C₄-C₁₂ bicycloalkyl; and

35 (viii) a group represented by the following graphic formula:



wherein L is hydrogen or C₁-C₄ alkyl and M is selected from the unsubstituted, mono-, and di-substituted members of the group consisting of naphthyl, phenyl, furanyl, and thienyl,

5 each of said group substituents being C₁-C₄ alkyl, C₁-C₄ alkoxy, or halogen; or

(d) B and B' taken together form fluoren-9-ylidene, mono-, or di-substituted fluoren-9-ylidene or a member selected from the group consisting of saturated C₃-C₁₂ 10 spiro-monocyclic hydrocarbon rings, saturated C₇-C₁₂ spiro-bicyclic hydrocarbon rings, and saturated C₇-C₁₂ spiro-tricyclic hydrocarbon rings, each of said fluoren-9-ylidene substituents being selected from the group consisting of C₁-C₄ alkyl, C₁-C₄ alkoxy, and halogen; said halogen or halo group 15 herein being bromo, chloro, fluoro or iodo and said aryl groups herein being phenyl or naphthyl.

2. A naphthopyran compound of claim 1 wherein,

(a) R₁ and R₂ are each selected from the group 20 consisting of:

(i) hydrogen, hydroxy, C₁-C₆ alkyl, C₁-C₆ haloalkyl, di-substituted amino, C₃-C₇ cycloalkyl, benzyl, mono-substituted benzyl, and the group, -C(O)W, wherein W is C₁-C₆ alkoxy, di(C₁-C₆)alkylamino, morpholino, or piperidino, 25 said amino substituents being C₁-C₆ alkyl, said benzyl substituents being C₁-C₆ alkyl or C₁-C₆ alkoxy;

(ii) mono- di- and tri-substituted members selected from the group consisting of phenyl, naphthyl, and dibenzofuranyl, said group substituents in (a)(ii) being 30 selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, di-substituted amino, said amino substituents being C₁-C₆ alkyl;

(iii) monosubstituted phenyl, having a substituent at the para position that is a linking group, $-\text{O}-(\text{CH}_2)_t-$, wherein t is the integer 3, 4, or 5, connected to an aryl group, which is a member of another photochromic 5 naphthopyran;

(iv) a group, $-\text{OR}_5$, wherein R_5 is $\text{C}_1\text{-C}_6$ alkyl, $\text{C}_1\text{-C}_6$ acyl, $\text{C}_1\text{-C}_6$ alkoxy($\text{C}_2\text{-C}_4$)alkyl, benzoyl, or monosubstituted benzoyl, said benzoyl group substituents being $\text{C}_1\text{-C}_6$ alkyl or $\text{C}_1\text{-C}_6$ alkoxy; or R_5 is the group $-\text{CH}(\text{R}_6)\text{Q}$, 10 wherein R_6 is hydrogen and Q is $-\text{COOR}_7$, and R_7 is $\text{C}_1\text{-C}_3$ alkyl; or R_5 is the group, $-\text{C}(\text{O})\text{V}$, wherein V is $\text{C}_1\text{-C}_6$ alkoxy, or di($\text{C}_1\text{-C}_6$)alkylamino;

(v) a group, $-\text{CH}(\text{Q}')_2$, wherein Q' is $-\text{COOR}_8$, wherein R_8 is $\text{C}_1\text{-C}_6$ alkyl, or phenyl($\text{C}_1\text{-C}_3$)alkyl;

15 (vi) a group, $-\text{CH}(\text{R}_9)\text{G}$, wherein R_9 is $\text{C}_1\text{-C}_6$ alkyl, and G is $\text{C}_1\text{-C}_6$ alkoxy, $-\text{COOR}_8$, or $-\text{CH}_2\text{OR}_{11}$, wherein R_{10} is $\text{C}_1\text{-C}_6$ alkyl, di($\text{C}_1\text{-C}_6$)alkylamino, morpholino, or piperidino, wherein R_{11} is $\text{C}_1\text{-C}_6$ alkyl, or $\text{C}_1\text{-C}_3$ alkoxy($\text{C}_1\text{-C}_6$)alkyl; and

20 (vii) a group, T , represented by the formula:
 $-\text{[(OC}_2\text{H}_4\text{)}_x(\text{OC}_3\text{H}_6\text{)}_y(\text{OC}_4\text{H}_8\text{)}_z\text{]}Z'$

wherein Z' is $\text{C}_1\text{-C}_3$ alkoxy or a polymerizable group, x , y and z are each a number between 0 and 50, and the sum of x , y and z is between 2 and 50; or

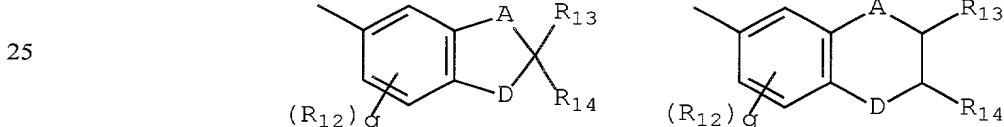
25 (viii) R_1 and R_2 together form an oxo group, or a substituted or unsubstituted spiro-heterocyclic group containing 1 or 2 oxygen atoms and 3 to 6 carbon atoms including the spirocarbon atom, said spiro-heterocyclic group being annellated with 1 or 2 benzene rings, said substituents 30 being or $\text{C}_1\text{-C}_6$ alkyl;

(b) each R_3 is independently selected from the group consisting of hydrogen, $\text{C}_1\text{-C}_6$ alkyl, $\text{C}_1\text{-C}_6$ alkoxy, di($\text{C}_1\text{-C}_6$)alkylamino, piperidyl, morpholinyl, pyrrolidyl, halogen, a group, T , and the group $-\text{C}(\text{O})\text{W}$ and n is the integer 35 0, 1, or 2, or when n is 2, and the R_3 substituents are

adjacent, a pair of substituents independently forms a substituted or unsubstituted fused carbocyclic or heterocyclic ring selected from the group consisting of benzo, dihydrofuran and benzofuro, the substituents of said fused carbocyclic or heterocyclic ring being selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, and di-substituted amino, said amino substituents being C₁-C₆ alkyl; said R₃ ring being fused to the o, p or q side of the naphthopyran;

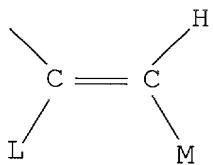
5 (c) B and B' are each selected from the group consisting of:

10 (i) a mono-, or di-substituted phenyl group;
(ii) an unsubstituted, mono- or di-substituted heteroaromatic group selected from the group consisting of furanyl, benzofuran-2-yl, thienyl, benzothien-2-yl, and
15 dibenzofuranyl, each of said phenyl and heteroaromatic substituents in (c) (i) and (ii) being selected from the group consisting of hydroxy, amino, mono(C₁-C₆)alkylamino, di(C₁-C₆)alkylamino, piperidino, morpholino, pyrryl, C₁-C₃ alkyl, C₁-C₃ chloroalkyl, C₁-C₃ fluoro-alkyl, C₁-C₃ alkoxy, mono(C₁-C₃)alkoxy(C₁-C₃)alkyl, fluoro and chloro;
20 (iii) a group represented by one of the following graphic formula:



wherein A is methylene and D is oxygen; each R₁₂ is C₁-C₃ alkyl, or C₁-C₃ alkoxy; R₁₃ and R₁₄ are each hydrogen or C₁-C₄ alkyl; and q is the integer 0, or 1;

30 (iv) C₁-C₄ alkyl,
(v) a group represented by the following graphic formula:



wherein L is hydrogen or methyl and M is phenyl or selected mono-, substituted phenyl, said phenyl substituent being C₁-C₃ alkyl, C₁-C₃ alkoxy, or fluoro; or

5 (d) B and B' taken together form fluoren-9-ylidene, mono-substituted fluoren-9-ylidene or a member selected from the group consisting of saturated C₃-C₈ spiro-monocyclic hydrocarbon rings, saturated C₇-C₁₀ spiro-bicyclic hydrocarbon rings, and saturated C₇-C₁₀ spiro-tricyclic 10 hydrocarbon rings, said fluoren-9-ylidene substituent being selected from the group consisting of C₁-C₃ alkyl, C₁-C₃ alkoxy, fluoro and chloro;

3. A naphthopyran compound of claim 2 wherein:

15 (a) R₁ and R₂ are each selected from the group consisting of:

(i) hydrogen, hydroxy, C₁-C₃ alkyl, and the group, -C(O)W, wherein W C₁-C₆ alkoxy, or morpholino;

20 (ii) unsubstituted, and mono-substituted phenyl, said phenyl substituents in (a)(ii) being selected from the group consisting of C₁-C₆ alkoxy, and di-substituted amino, said amino substituents being of C₁-C₃ alkyl,

25 (iii) monosubstituted phenyl, having a substituent at the para position that is a linking group, -O-(CH₂)_t- wherein t is the integer 3, connected to an aryl group, which is a member of another photochromic naphthopyran;

(iv) a group, -OR₅, wherein R₅ is C₁-C₆ alkyl, C₁-C₆ alkoxy(C₂-C₄)alkyl, the group -CH(R₆)Q, wherein R₆ is hydrogen or C₁-C₃ alkyl and Q is -COOR₇, and R₇ is C₁-C₃ alkyl; or R₅ is the group, -C(O)V, wherein V is C₁-C₆ alkoxy;

30 (v) a group, -CH(Q')₂, wherein Q' is -COOR₈, wherein R₈ is C₁-C₆ alkyl.

(vi) a group, $-\text{CH}(\text{R}_9)\text{G}$, wherein R_9 is $\text{C}_1\text{-C}_6$ alkyl and G is $\text{C}_1\text{-C}_6$ alkoxy, $-\text{COOR}_8$, $-\text{COR}_{10}$ or $-\text{CH}_2\text{OR}_{11}$, wherein R_{10} and R_{11} are each $\text{C}_1\text{-C}_6$ alkyl; and

(vii) a group, T , represented by the formula:

5 $-[(\text{OC}_2\text{H}_4)_x(\text{OC}_3\text{H}_6)_y(\text{OC}_4\text{H}_8)_z]\text{Z}'$

wherein Z' is $\text{C}_1\text{-C}_3$ alkoxy or a polymerizable group, x , y and z are each a number between 0 and 50, and the sum of x , y and z is between 2 and 50; or

10 (viii) R_1 and R_2 together form an oxo group, a substituted or unsubstituted spiro-heterocyclic group containing 1 oxygen atom and 6 carbon atoms including the spirocarbon atom, said spiro-heterocyclic group being annellated with 2 benzene rings, said substituents being $\text{C}_1\text{-C}_3$ alkyl;

15 (b) each R_3 is independently selected from the group consisting of hydrogen, $\text{C}_1\text{-C}_6$ alkyl, $\text{C}_1\text{-C}_6$ alkoxy, morpholinyl, a group, T , and the group $-\text{C}(\text{O})\text{W}$ and n is the integer 0, 1, or 2, or when n is 2, and the R_3 substituents are adjacent, the pair of substituents independently forms a 20 substituted or unsubstituted fused carbocyclic or heterocyclic ring selected from the group consisting of benzo, and benzofuro, the substituents of said fused carbocyclic or heterocyclic ring being $\text{C}_1\text{-C}_6$ alkoxy; said R_3 ring being fused to the o , p or q side of the naphthopyran;

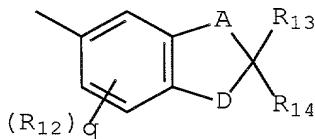
25 (c) B and B' are each selected from the group consisting of:

(i) an unsubstituted, mono-, or di-substituted phenyl group;

30 (ii) an unsubstituted, mono- or di-substituted heteroaromatic group selected from the group consisting of furanyl, benzofuran-2-yl, thieryl, benzothien-2-yl, and dibenzofuranyl, each of said phenyl and heteroaromatic substituents in (c) (i) and (ii) being selected from the group consisting of hydroxy, piperidino, morpholino, $\text{C}_1\text{-C}_3$ alkyl, and $\text{C}_1\text{-C}_3$ alkoxy;

(iii) a group represented by the following graphic formula:

5



wherein A is methylene and D is oxygen; each R₁₂ is C₁-C₃ alkyl, or C₁-C₃ alkoxy; R₁₃ and R₁₄ are each hydrogen or C₁-C₃ alkyl; and q is the integer 0, or 1; or

(d) B and B' taken together form fluoren-9-ylidene, adamantylidene, bornylidene, norbornylidene, or bicyclo[3.3.1]nonan-9-ylidene.

15 4. A naphthopyran compound selected from:

(a) 3,3,9-triphenyl-3H-9H-

indeno[3',2':3,4]naphtho[1,2-b]pyran;

(b) 3,3-di(4-methoxyphenyl)-9-phenyl-3H-9H-
indeno[3',2':3,4]naphtho[1,2-b]pyran;

20 (c) 3-(4-methoxyphenyl)-3,9-diphenyl-3H-9H-
indeno[3',2':3,4]naphtho[1,2-b]pyran;

(d) 3-(4-morpholinophenyl)-3,9-diphenyl-3H-9H-
indeno[3',2':3,4]naphtho[1,2-b]pyran;

25 (e) 3,3-di(4-methoxyphenyl)-9-(3-methoxyphenyl)-
11-methoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

(f) 3-(4-methoxyphenyl)-3-phenyl-9-(3-
methoxyphenyl)-11-methoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-
b]pyran;

30 (g) 3-(4-methoxyphenyl)-3-phenyl-9-methyl-11-
methoxy-9-(3-methoxyphenyl)-3H-9H-
indeno[3',2':3,4]naphtho[1,2-b]pyran;

(h) 3,3-di(4-methoxyphenyl)-9-methyl-11-methoxy-9-
(3-methoxyphenyl)-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

35 (i) 3,3-di(4-methoxyphenyl)-9-methyl-11-methoxy-
3H-9H-indeno[3',2':3,4]naphtho [1,2-b]pyran;

(j) 3,3-di(4-methoxyphenyl)-9,9-dimethyl-11-methoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

(k) 3-(4-methoxyphenyl)-3-phenyl-9,9-dimethyl-11-methoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

5 (l) 3,3-di(4-methoxyphenyl)-9,9-dimethyl-7,11-dimethoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

(m) 3-(4-methoxyphenyl)-3-phenyl-9,9-dimethyl-7,11-dimethoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

(n) 3-(4-morpholinophenyl)-3-phenyl-9,9-dimethyl-10 7,11-dimethoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

(o) 3,3-di(4-methoxyphenyl)-9-methyl-11,13-dimethoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

(p) 3-(4-methoxyphenyl)-3-phenyl-9-methyl-11,13-dimethoxy-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran;

15 (q) 3-(4-methoxyphenyl)-3-phenyl-9,9-dimethyl-3H-9H-benzo[4'',5'']indeno[3',2':3,4]naphtho[1,2-b]pyran; and

(r) 3,3-di(4-methoxyphenyl)-9,9-dimethyl-11-fluoro-3H-9H-indeno[3',2':3,4]naphtho[1,2-b]pyran.

20 5. A photochromic article comprising a polymeric organic host material and a photochromic amount of the naphthopyran compound of claim 1.

6. The photochromic article of claim 5 wherein
25 the polymeric organic host material is selected from the group consisting of poly(C₁-C₁₂ alkyl methacrylates), poly(oxyalkylene dimethacrylates), poly(alkoxylated phenol methacrylates), cellulose acetate, cellulose triacetate, cellulose acetate propionate, cellulose acetate butyrate,
30 poly(vinyl acetate), poly(vinyl alcohol), poly(vinyl chloride), poly(vinylidene chloride), thermoplastic polycarbonates, polyesters, polyurethanes, polythiourethanes, poly(ethylene terephthalate), polystyrene, poly(alpha methylstyrene), copoly(styrene-methylmethacrylate),
35 copoly(styrene-acrylonitrile), polyvinylbutyral and polymers of members of the group consisting of bis(allyl carbonate)

monomers, polyfunctional acrylate monomers, polyfunctional
methacrylate monomers, diethylene glycol dimethacrylate
monomers, diisopropenyl benzene monomers, ethoxylated
bisphenol A dimethacrylate monomers, ethylene glycol
5 bismethacrylate monomers, poly(ethylene glycol)
bismethacrylate monomers, ethoxylated phenol bismethacrylate
monomers, alkoxylated polyhydric alcohol acrylate monomers,
styrene monomers, urethane acrylate monomers, glycidyl
acrylate monomers, glycidyl methacrylate monomers and
10 diallylidene pentaerythritol monomers.

7. The photochromic article of claim 6 wherein
the polymeric organic host material is a solid transparent
polymer selected from the group consisting of poly(methyl
15 methacrylate), poly(ethylene glycol bismethacrylate),
poly(ethoxylated bisphenol A dimethacrylate), thermoplastic
polycarbonate, poly(vinyl acetate), polyvinylbutyral,
polyurethane, polythiourethane and polymers of members of the
group consisting of diethylene glycol bis(allyl carbonate)
20 monomers, diethylene glycol dimethacrylate monomers,
ethoxylated phenol bismethacrylate monomers, diisopropenyl
benzene monomers and ethoxylated trimethylol propane
triacrylate monomers.

25 8. The photochromic article of claim 7 wherein
the photochromic compound is present in an amount of from 0.05
to 2.0 milligram per square centimeter of organic host
material surface to which the photochromic substance(s) is
incorporated or applied.

30

9. The photochromic article of claim 8 wherein
said article is a lens.

10. A photochromic article comprising a polymeric
35 organic host material selected from the group consisting of
poly(methyl methacrylate), poly(ethylene glycol

bismethacrylate), poly(ethoxylated bisphenol A dimethacrylate), thermoplastic polycarbonate, poly(vinyl acetate), polyvinylbutyral, polyurethane, polythiourethane and polymers of members of the group consisting of diethylene 5 glycol bis(allyl carbonate) monomers, diethylene glycol dimethacrylate monomers, ethoxylated phenol bismethacrylate monomers, diisopropenyl benzene monomers and ethoxylated trimethylol propane triacrylate monomers, and a photochromic amount of the naphthopyran compound of claim 2.

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11. A photochromic article comprising a polymeric organic host material selected from the group consisting of poly(methyl methacrylate), poly(ethylene glycol bismethacrylate), poly(ethoxylated bisphenol A dimethacrylate), thermoplastic polycarbonate, poly(vinyl acetate), polyvinylbutyral, polyurethane, polythiourethane and polymers of members of the group consisting of diethylene 15 glycol bis(allyl carbonate) monomers, diethylene glycol dimethacrylate monomers, ethoxylated phenol bismethacrylate monomers, diisopropenyl benzene monomers and ethoxylated trimethylol propane triacrylate monomers, and a photochromic 20 amount of the naphthopyran compound of claim 3.

12. A photochromic article comprising a 25 polymerizate of an optical organic resin monomer and a photochromic amount of the naphthopyran compound of claim 1.

13. The photochromic article of claim 12 wherein the refractive index of the polymerizate is from about 1.48 30 to about 1.75.

14. The photochromic article of claim 12 wherein the polymerizate is an optical element.

35 15. The photochromic article of claim 14 wherein said optical element is an ophthalmic lens or a contact lens.

16. A photochromic article comprising, in combination, a solid transparent polymeric organic host material, and a photochromic amount of each of (a) at least 5 one naphthopyran compound of claim 1, and (b) at least one other organic photochromic compound having at least one activated absorption maxima within the range of between about 400 and 700 nanometers.

10 17. The photochromic article of claim 16 wherein the polymeric organic host material is a solid transparent homopolymer or copolymer selected from the group consisting of poly(methyl methacrylate), poly(ethylene glycol bis-methacrylate), poly(ethoxylated bisphenol A dimethacrylate), 15 thermoplastic polycarbonate, poly(vinyl acetate), polyvinylbutyral, polyurethane, polythiourethane and polymers of members of the group consisting of diethylene glycol bis(allyl carbonate) monomers, diethylene glycol dimethacrylate monomers, ethoxylated phenol bismethacrylate 20 monomers, diisopropenyl benzene monomers and ethoxylated trimethylol propane triacrylate monomers.

18. The photochromic article of claim 16 wherein the organic photochromic compound (b) is selected from the 25 group consisting of naphthopyrans, benzopyrans, phenanthropyrans, indenonaphthopyrans, oxazines, organo-metal dithizonates, fulgides, fulgimides, spiro(indoline)pyrans and mixtures thereof.

30 19. The photochromic article of claim 18 wherein the total amount of photochromic compound present is from 0.05 to 1.0 milligram per square centimeter of organic host material surface to which the photochromic substance(s) is incorporated or applied.

20. The photochromic article of claim 19 wherein the article is an ophthalmic lens on a contact lens.

21. A photochromic article comprising, in
5 combination, a polymeric organic host material selected from the group consisting of poly(methyl methacrylate), poly(ethylene glycol bismethacrylate), poly(ethoxylated bisphenol A dimethacrylate), thermoplastic polycarbonate, poly(vinyl acetate), polyvinylbutyral, polyurethane,
10 polythiourethane and polymers of members of the group consisting of diethylene glycol bis(allyl carbonate) monomers, diethylene glycol dimethacrylate monomers, ethoxylated phenol bismethacrylate monomers, diisopropenyl benzene monomers and ethoxylated trimethylol propane triacrylate monomers, and a
15 photochromic amount of each of (a) at least one naphthopyran compound of claim 3, and (b) at least one other organic photochromic compound having at least one activated absorption maxima within the range of between about 400 and 700 nanometers.